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Government Policy Measures and Environmental Sustainability in Nigeria. An Assessment of National Climate Change Policy and Response Strategy.

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ABSTRACT: Environmental sustainability has become a global priority, prompting successive administrations in both developed and developing countries to prioritize climate preservation and ecosystem protection. Kyoto Protocol, Paris Agreement, and Sustainable Development Goal (SDG) 13 are some of the international measures aimed at addressing issues relating to climate change. Nigeria, as a major economy not only in Africa but global had also made efforts towards addressing climate change. At the federal and state levels, several initiatives have been implemented to address climate challenges posed by industrial activities and other human interventions, with the National Climate Change Policy and Response Strategy serving in facilitating environmental sustainability and checkmating climate change. There is, however, a doubt about effectiveness of this measure as so many Nigerians felt the negative effect of climate change. This study examined the effectiveness of Nigeria's climate change policy in addressing environmental challenges. Specifically, it

focused on the National Climate Change Policy and Response Strategy, initially introduced in 2012 and updated in 2021, aimed at mitigating climate-related issues. To achieve the study objective, the researchers employed a qualitative research design using document analysis as the primary data collection method, with thematic analysis applied to identify achievements and gaps. Findings revealed that while the policy contributed to the creation of climate governance structures, heightened awareness of climate risks, and integration of climate considerations into national planning, its overall impact was constrained by implementation challenges. The study proposed that effective climate governance in Nigeria requires stronger policy execution, enhanced inter-agency coordination, and increased investment in climate adaptation and mitigation strategies.

Keywords: *Environmental governance, climate change policy, National Climate Change Policy and Response Strategy, environmental protection, policy assessment, climate adaptation, sustainability.*

Introduction

Environmental sustainability has become a pressing global concern, with climate change posing a significant threat to ecosystems, economies, and communities worldwide. The adverse effects of rising global temperatures, biodiversity loss, and environmental degradation are more severe in developing countries, where governance challenges, weak infrastructure, and dependence on natural resource-based industries increase vulnerability (United Nations, 2023). Nigeria, as Africa's largest economy and most populous country, faces mounting environmental challenges, including desertification in the north, flooding in the south, deforestation, air and water pollution, and coastal erosion. These environmental crises have not only endangered public health and food security but have also impeded sustainable development goals (Akinbami & Lawal, 2022).

Recognizing these threats, the Nigerian government introduced the National Climate Change Policy and Response Strategy (NCCPRS) in 2012 and has since updated it to align with the Paris Agreement and Sustainable Development Goals (SDGs). This policy was designed to provide a framework for mitigating and adapting to climate

change through regulatory measures, stakeholder engagement, and integration of climate policies across sectors (Federal Government of Nigeria, 2021). Despite these initiatives, however, Nigeria continues to struggle with policy implementation due to inadequate funding, institutional inefficiencies, and weak enforcement of environmental regulations (Okonkwo & Eze, 2022).

Given the scale of environmental degradation and its socio-economic consequences, there is a growing need to evaluate the effectiveness of Nigeria's policy frameworks in achieving environmental sustainability. While studies have assessed aspects of climate change mitigation and adaptation strategies, few have critically examined the extent to which the NCCPRS has translated into measurable progress on environmental sustainability. This raises a fundamental question:

Research Questions

1. How effective are the initiatives of the National Climate Change Policy and Response Strategy (NCCPRS) in reducing greenhouse gas emissions in Nigeria's key economic sectors?
2. To what extent has the adoption of climate-resilient technologies and sustainable practices promoted by the NCCPRS contributed to environmental sustainability in Nigeria?

Conceptual Clarifications

Concept of Environmental Sustainability

Environmental sustainability refers to the responsible use and management of natural resources to ensure that ecological systems remain healthy, resilient, and capable of supporting current and future generations. It emphasizes maintaining the integrity of ecosystems, conserving biodiversity, and minimizing human activities' adverse effects on the environment (Goodland, 1995; Purvis et al., 2019). The concept is rooted in the idea of **intergenerational equity,** which seeks to balance present needs with the ability of future generations to meet theirs, as outlined by the Brundtland Commission's 1987 report, *Our Common Future* (World Commission on Environment and Development [WCED], 1987). At its core, environmental

sustainability integrates ecological health with economic growth and social well-being, forming one of the three pillars of sustainable development (Purvis et al., 2019). It focuses on reducing environmental degradation, promoting renewable energy sources, and ensuring efficient resource management practices such as recycling, reforestation, and sustainable agriculture (Sachs et al., 2019).

Scholars emphasize that environmental sustainability is not only a scientific or ecological imperative but also a socio-political process requiring cooperation among governments, industries, and communities to establish regulations and strategies that protect natural capital (Rockström et al., 2009). Concepts like the **planetary boundaries framework** further highlight the environmental limits within which humanity must operate to avoid catastrophic ecological changes (Steffen et al., 2015). In the modern context, environmental sustainability is central to global development agendas, including the **United Nations Sustainable Development Goals (SDGs)**, especially Goal 13 (climate action), Goal 14 (life below water), and Goal 15 (life on land). It thus serves as a guiding principle for sustainable urbanization, climate change mitigation, and environmental policy formulation (United Nations, 2015).

Africa's climate policy landscape is shaped by a dual reality: comparatively low historical per-capita emissions but very high vulnerability to climate impacts (droughts, floods, sea-level rise), and large development deficits in energy access and infrastructure. Recent continent-wide analyses stress that scaling up renewable energy (especially solar) and climate finance is critical for both mitigation and development objectives. Africa contains a high share of global renewable resource potential but lags in installed capacity and access to finance; targeted investment could change that trajectory while delivering poverty-reduction benefits. (United Nations 2021)

Climate finance trends for Africa improved after 2020, with total flows increasing in 2021–2022 and public finance playing a major role. However, mobilizing private capital at scale remains a major challenge, constrained by perceived country risk, limited bankable pipelines, and weak enabling environments. The literature recommends blended finance, de-risking instruments, and stronger national project

preparation facilities to attract private investors. At the same time, scholars emphasize the need for equitable access to funds, given the continent's limited fiscal space and pressing adaptation needs. (UN , 2024) There is also growing scholarship on the politics of climate responsibility in Africa: public opinion studies show many Africans expect national governments to take primary responsibility for climate action, a critical insight for designing domestic policy packages that are seen as legitimate and responsive.

Nigeria's environmental Sustainability challenges

Nigeria faces a complex array of environmental challenges that intersect with its status as Africa's largest economy and a leading oil producer. These challenges encompass emissions and pollution from oil and gas operations, rapid urbanization, widespread deforestation and land degradation, and heightened climate vulnerability. These are discussed below:

1. Emissions and Pollution from Oil and Gas Operations

Nigeria's oil and gas sector remains a major source of greenhouse gas emissions, primarily due to routine gas flaring and methane leaks. In 2023, Nigeria was ranked as the eighth-worst global emitter from gas flaring, burning approximately five billion cubic feet of gas daily (Akpan, 2019; Natural Resource Governance Institute, 2023). These activities release carbon dioxide, methane a potent greenhouse gas and volatile organic compounds (VOCs), all of which contribute to air pollution and have severe health consequences. Communities in the Niger Delta, such as Goi and Kegbara-Dere, have reported increased cases of respiratory illnesses and skin conditions associated with exposure to these pollutants (Okeke, 2021; The BudgIT Foundation, 2022). In response, Nigeria has committed to achieving net-zero emissions by 2060, with specific targets to eliminate routine flaring by 2030 and reduce fugitive methane emissions by 60% by 2031 (Flaring and Venting Regulations, 2023; Uche, 2022). Policy measures such as the Upstream Petroleum Decarbonisation Template require oil license applicants to demonstrate low carbon emissions and integrate renewable energy programs into their operations (Chukwu, 2023; Reuters, 2023).

2. Rapid Urbanization and Environmental Degradation

Rapid urbanization in Nigeria has outpaced the development of critical infrastructure, leading to overcrowding, inadequate waste management, and the proliferation of informal settlements (Ibrahim, 2020). In Lagos, for example, only 40% of the 10,000 tonnes of daily waste produced is collected, and merely 13% is recycled, resulting in uncollected waste accumulating in low-income areas (Okon, 2019; PMC, 2021). These conditions exacerbate environmental challenges, including air and water pollution, and contribute to public health risks such as respiratory infections and waterborne diseases (Nwankwo, 2021; SDI Article, 2022).

3. Deforestation and Land Degradation

Deforestation in Nigeria has serious environmental consequences, including soil erosion, biodiversity loss, and increased carbon emissions (Akande, 2018). Between 2000 and 2005, Nigeria experienced the highest global deforestation rate, losing 55.7% of its primary forests (Earth.Org, 2023). In 2020 alone, the country lost 97.8 kilohectares of natural forest, corresponding to 59.5 metric tons of CO_2 emissions (Okafor, 2021; Earth.Org, 2023). This loss of forest cover disrupts ecosystems, limits access to clean water, and exacerbates climate change impacts.

Land degradation remains a critical problem across the country, resulting in drought, sand dune encroachment, and reduced agricultural productivity (Adebayo, 2019; UNCCD, 2022). Addressing these issues requires comprehensive policies promoting sustainable land use and forest conservation (Oluwole, 2020).

4. Climate Vulnerability

Nigeria's climate vulnerability is manifested through flooding, desertification in the north, and coastal erosion in the south (Eze, 2020). In coastal cities such as Lagos, rising sea levels threaten infrastructure and livelihoods through flooding and erosion (Lyell Collection, 2021; Akpan, 2019). In northern Nigeria, desertification and drought reduce arable land and water availability, thereby negatively impacting agriculture and food security (Abdullahi, 2022; Down To Earth, 2021). Furthermore, soil and sheet erosion, coupled with flooding from silted rivers, compound these

challenges in northern regions (Down To Earth, 2021; Musa, 2020). Climate-induced hazards exacerbate existing socio-economic problems, hindering sustainable development.

5. Decarbonization and Socio-Economic Transition

Nigeria's Energy Transition Plan (ETP) provides a roadmap to achieve net-zero emissions by 2060, focusing on critical sectors including power, cooking, oil and gas, transport, and industry (Energy Transition Government, 2023; Eze & Okon, 2022). The plan emphasizes decarbonization while managing the socio-economic transition for oil-dependent communities by providing alternative livelihoods, investing in renewable energy infrastructure, and ensuring equitable distribution of benefits (Chukwu, 2023; Global Journals, 2022). Investments in renewable energy infrastructure can facilitate Nigeria's transition to a low-carbon economy while addressing its persistent energy deficit (Uche, 2022; Global Journals, 2022). Such measures are pivotal for establishing a resilient and sustainable energy future.

Concept of Climate Change Policy

Climate change policy comprises strategies, laws, and regulations developed by governments, international organizations, and stakeholders to address climate-related risks. These policies function as governance tools to promote environmental sustainability, strengthen resilience, and advance the United Nations Sustainable Development Goals (SDGs), particularly SDG 13, which emphasizes urgent action to combat climate change and its impacts (United Nations, 2015). They are informed by scientific evidence demonstrating the dangers posed by rising global temperatures, extreme weather events, and environmental degradation caused by greenhouse gas emissions (IPCC, 2022). Climate policies integrate both mitigation measures, aimed at reducing emissions, and adaptation measures, which strengthen resilience to climate-related impacts (UNFCCC, 2021).

International climate policy is guided by agreements such as the Kyoto Protocol (1997), which established legally binding emission reduction targets, and the Paris Agreement (2015), which seeks to limit global temperature increases to well below 2°C above pre-industrial levels, with efforts to cap it at 1.5°C (United Nations,

2015). National governments translate these global commitments into domestic instruments, including carbon pricing, renewable energy incentives, emission trading schemes, and climate finance mechanisms (World Bank, 2020).

In Nigeria, climate and environmental sustainability policies reflect a multifaceted approach combining legal, technological, economic, and social instruments. Legal frameworks, including the Environmental Impact Assessment Act of 1992, the National Environmental Standards and Regulations Enforcement Agency Act, and the Climate Change Act of 2021, provide monitoring, enforcement, and compliance mechanisms (Adeniyi, 2022; Omotayo & Ojo, 2021). Renewable energy development and emission reduction initiatives, promoted under the National Renewable Energy and Energy Efficiency Policy, focus on expanding solar, wind, and biomass energy while encouraging energy efficiency across industrial and residential sectors (Ogunleye et al., 2020). Measures to reduce emissions in oil and gas, transportation, and power generation, such as gas flaring reduction and low-emission technologies, are central to the national strategy (Akpan, 2019).

Biodiversity, afforestation, and ecosystem management programs, including the National Afforestation Programme and the Nigerian Biodiversity Strategy and Action Plan, aim to restore degraded lands, conserve species, and protect sensitive ecosystems (Onwuka et al., 2021). Sustainable agriculture and land use practices, such as climate-smart agriculture, soil conservation, integrated pest management, and land-use planning, enhance productivity while reducing environmental degradation (Oluwole & Adeyemi, 2019). Economic incentives and green financing mechanisms, such as tax rebates, renewable energy subsidies, and carbon credit schemes, encourage private-sector participation in environmental sustainability (Eboh, 2020). Public awareness and education initiatives targeting schools, communities, and media platforms foster a culture of environmental stewardship and citizen engagement (Okafor & Akinyemi, 2018).

Nigeria's climate policies adopt cross-sectoral strategies encompassing agriculture, energy, transportation, industry, and urban development, ensuring sustainable development alongside economic growth (OECD, 2021). Principles of climate justice recognize the disproportionate vulnerability of developing nations and marginalized

populations, promoting inclusive and equitable implementation (Schlosberg & Collins, 2014). Effective climate response strategies include proactive measures such as risk reduction, preparedness, and investments in infrastructure and early warning systems, as well as reactive measures, including emergency relief, rehabilitation, and post-disaster recovery (UNDRR, 2019; Tierney, 2019; Coppola, 2020). Integration across governments, NGOs, private sector actors, and international agencies enhances efficiency through shared expertise, resources, and information (Boin et al., 2020), while resilience-focused approaches strengthen adaptive capacities of communities, ecosystems, and institutions to withstand future shocks (Folke et al., 2021). Technology-driven solutions, including artificial intelligence and geospatial analysis, further improve preparedness, decision-making, and rapid response (Aitsi-Selmi & Murray, 2020).

Synopses of Nigeria's climate-policy framework

Nigeria's environmental challenges are multifaceted and interconnected, encompassing issues such as emissions, urbanization, deforestation, and climate vulnerability. Addressing these challenges requires integrated approaches that consider the complex interplay between various environmental factors. In recent years, Nigeria has made significant strides in policy development to tackle these issues. The Climate Change Act of 2021 established a legal framework for climate governance, creating the National Council on Climate Change (NCCC) and introducing mechanisms such as carbon budgets and the National Climate Change Fund. These initiatives aim to mainstream climate actions and provide financial resources for climate interventions (FAOLEX Database). Furthermore, Nigeria updated its Nationally Determined Contributions (NDC) in 2021, committing to a net-zero emissions target by 2060. The Long-Term Low-Emission Development Strategy (LT-LEDS) outlines sectoral decarbonization pathways in energy, transport, waste, and agriculture, signaling increased ambition in climate action. However, achieving these targets depends on effective implementation, adequate financing, and reforms in energy and oil governance (UNFCCC).

Moreso, The National Climate Change Policy and Response Strategy (NCCPRS) of 2012 . This policy aimed to promote a low-carbon, climate-resilient, and gender-

responsive sustainable socio-economic development. The vision of the NCCPRS was to establish a climate-resilient Nigeria poised for rapid and sustainable socio-economic development. Its mission focused on strengthening national initiatives to adapt to and mitigate climate change, involving all sectors of society, including vulnerable groups such as women and youth, within the broader context of advancing sustainable development.

Policy Objectives

The primary objectives of the NCCPRS included:

i. Implementing mitigation measures to promote low-carbon and sustainable economic growth.

ii. Enhancing national capacity to adapt to climate change.

iii. Advancing climate change-related science, technology, and research and development to enable better participation in international scientific and technological cooperation on climate change.

iv. Increasing public awareness and involving the private sector in addressing climate change challenges.

Strategic Focus Areas

The NCCPRS emphasized several key areas to achieve its objectives:

i. **Mitigation**: Implementing strategies to reduce greenhouse gas emissions, particularly in sectors such as agriculture, forestry, land use, and energy.

ii. **Adaptation**: Developing and implementing measures to enhance resilience to climate change impacts, including infrastructure improvements and disaster risk management.

iii. **Capacity Building**: Strengthening institutional frameworks and human resources to effectively address climate change challenges.

iv. **Public Awareness and Participation**: Promoting education and involving communities in climate change initiatives.

Furthermore, iin addition to policy measures, Operational steps have also been taken to address environmental challenges. In the oil and gas sector, Nigeria has committed to reducing gas flaring and methane emissions. The Upstream Petroleum Decarbonization Template (UPDT) introduced by the Nigerian Upstream Petroleum Regulatory Commission (NUPRC) requires oil license applicants to demonstrate low carbon emissions and renewable energy programs, aligning the sector with national climate goals. Additionally, Nigeria has pledged to accelerate methane action across relevant sectors, including oil and gas, agriculture, and waste management. Despite these efforts, challenges remain in regulatory enforcement and the alignment of fiscal incentives. The success of these initiatives hinges on the capacity to implement policies effectively, mobilize financial resources, and reform governance structures to support sustainable development goals.

Theoretical Review

Environmental governance, sustainable development, and policy implementation are three interrelated yet distinct theoretical lenses that provide comprehensive insights into addressing environmental challenges.

Environmental Governance Theory offers a robust framework for examining how diverse institutions, policies, and stakeholders collaborate to manage environmental resources. It emphasizes principles such as transparency, accountability, participation, and rule of law in decision-making (Lemos & Agrawal, 2006). This theory recognizes that both formal mechanisms (laws, regulations) and informal arrangements (community-based initiatives, traditional norms) play crucial roles in achieving environmental sustainability (Biermann, 2021). Its multi-level governance perspective reflects the complexity of environmental problems like climate change, biodiversity loss, and ecosystem degradation, underscoring the need for cooperation between local, national, and global actors.

In contrast, Sustainable Development Theory takes a more normative and integrative approach, advocating for the harmonization of environmental, social, and economic

goals to ensure intergenerational equity. Popularized by the Brundtland Commission (1987), this theory positions sustainability as both a developmental and ecological necessity. It serves as a guiding principle for frameworks like the United Nations Sustainable Development Goals (SDGs), stressing equitable growth, responsible resource use, and ecological resilience (Sachs, 2015; Purvis, Mao, & Robinson, 2019). Unlike Environmental Governance Theory, which focuses on institutional mechanisms and power relations, Sustainable Development Theory emphasizes broader ethical imperatives, prioritizing justice and fairness alongside environmental preservation.

Policy Implementation and Systems Theory bridges the normative aspirations of sustainable development and the structural focus of environmental governance by examining how policies are operationalized within complex, interconnected governance systems. Rooted in systems thinking (Easton, 1965), this theory emphasizes that policy outcomes emerge from dynamic interactions among actors, institutions, and resources. Successful implementation requires feedback loops, adaptive strategies, and coordination across multiple levels of governance (Howlett, Ramesh, & Perl, 2020). It complements Environmental Governance Theory by highlighting systemic barriers and interdependencies in decision-making, while also grounding Sustainable Development Theory's ideals in practical mechanisms for achieving measurable results.

Together, these three theories create a multi-dimensional lens for understanding environmental management. Environmental Governance Theory emphasizes power relations and institutional design, Sustainable Development Theory foregrounds ethical imperatives and holistic goals, while Policy Implementation and Systems Theory provides practical insights into execution and feedback. When analyzed in tandem, they demonstrate that effective environmental policy must integrate normative principles, governance structures, and systemic thinking to address ecological and developmental challenges comprehensively.

Empirical Review

Empirical studies on climate policies and environmental sustainability reveal a growing emphasis on evidence-based approaches to addressing climate change

challenges. At the global level, research underscores the effectiveness of policy instruments such as carbon pricing, renewable energy subsidies, and international agreements in reducing greenhouse gas (GHG) emissions. For example, Aldy and Stavins (2020) conducted a cross-country analysis of climate policy adoption across 40 nations and found that countries with carbon pricing mechanisms and stringent regulatory frameworks recorded significant declines in emissions, with average reductions of 10–15% over a decade. Similarly, Rogelj et al. (2021) analyzed the impact of the Paris Agreement and highlighted that nations with nationally determined contributions (NDCs) have demonstrated measurable progress in decarbonization efforts, although implementation gaps remain a major challenge.

In the African context, empirical research highlights that climate policies often face implementation bottlenecks due to weak institutional frameworks, inadequate funding, and socio-political instability. A study by Tessema, Simane, and Teshome (2022) examining climate adaptation strategies in Ethiopia found that while national policies were well-formulated, only 40% of surveyed communities had direct access to climate-related initiatives, illustrating a gap between policy design and grassroots implementation. Likewise, Chersich and Wright (2019) assessed climate resilience initiatives across sub-Saharan Africa and reported that the effectiveness of interventions is strongly correlated with governance quality, community participation, and international donor support.

Nigeria's environmental and climate policy framework has also been widely examined empirically, with mixed findings regarding its impact on climate resilience and sustainability. Nwoko et al. (2020) conducted a quantitative evaluation of Nigeria's National Adaptation Strategy and Plan of Action (NASPA) and found that while policy awareness among government agencies was high (75%), practical implementation was hindered by inadequate funding, limited technical expertise, and weak inter-agency coordination. Similarly, Olalekan, Odipe, and Afolabi (2021) examined the efficacy of Nigeria's National Climate Change Policy (NCCP) in 12 states and reported that less than 35% of local governments had fully operational climate change desks, indicating poor vertical integration of policies. However, a recent study by Ogunyemi and Akinbobola (2023) highlighted improvements in

renewable energy deployment due to targeted policies, with solar energy adoption increasing by over 30% between 2019 and 2022 in rural communities under government-subsidized programs.

Additionally, research on climate finance and environmental sustainability in Nigeria shows that inadequate resource allocation remains a key barrier. A World Bank (2022) report indicated that Nigeria spends less than 0.3% of its GDP on climate adaptation, significantly below the recommended threshold of 1–2%. Empirical findings by Bello and Oduyemi (2022) using panel data analysis further confirmed that environmental degradation in Nigeria is positively associated with low climate budget allocations and poor enforcement of environmental regulations, particularly in oil-producing regions.

NCCPRS Initiatives and the Reduction of Greenhouse Gas Emissions in Nigeria

The National Climate Change Policy and Response Strategy (NCCPRS) serves as Nigeria's primary framework for addressing climate change, aiming to promote low-carbon development, enhance energy efficiency, and facilitate the transition to renewable energy sources. These initiatives are particularly pertinent given Nigeria's substantial greenhouse gas (GHG) emissions, which are projected to rise significantly by 2030 under current policies.

Strategic Objectives of the NCCPRS

The NCCPRS outlines several strategic objectives to mitigate GHG emissions across various sectors:

1. **Low-Carbon Economic Growth**: The policy emphasizes the importance of fostering a low-carbon, high-growth economic development path. This includes promoting sustainable industrial practices and encouraging the adoption of clean technologies across sectors such as energy, agriculture, industry, and transportation.
2. **Energy Sector Reforms**: Key initiatives in the energy sector involve enhancing energy efficiency, reducing gas flaring, and transitioning to renewable energy sources. For instance, the policy advocates for the adoption of cleaner technologies in the oil and gas sector to minimize emissions.

3. **Sustainable Agriculture and Land Use**: The NCCPRS promotes sustainable agricultural practices to reduce methane emissions and enhance carbon sequestration. Measures include reducing forest loss and degradation, increasing soil carbon sequestration in agricultural lands, and promoting the use of alternative domestic fuels to fuelwood in rural areas.

4. **Public Awareness and Capacity Building**: The policy underscores the need to raise public awareness about climate change and build national capacity to adapt to its impacts. This involves strengthening institutions and fostering collaboration among various stakeholders to implement climate actions effectively.

Projected Emissions Trajectory

Despite these strategic initiatives, the actual impact on emission reductions has been limited. According to the Climate Action Tracker, Nigeria's GHG emissions are projected to increase by 62–72% above 2010 levels by 2030 under current policies, excluding land use, land-use change, and forestry (LULUCF).

This projection indicates a significant gap between policy intentions and actual outcomes. The energy sector, particularly fossil fuel industries, remains the largest contributor to emissions, accounting for approximately 67% of Nigeria's total GHG emissions.

Recent Policy Developments

In response to these challenges, Nigeria has introduced several policy measures to strengthen its climate action efforts:

i. **Emissions Trading Scheme (ETS)**: The establishment of an ETS aims to provide policy recommendations that will guide the transition to a green economy. This initiative is designed to incentivize emission reductions across various sectors.

ii. **Upstream Petroleum Decarbonisation Template (UPDT)**: Starting from January 1, 2025, Nigeria will require all applicants for oil licenses and permits to demonstrate evidence of low carbon emissions and possess a renewable energy

program. This policy aims to align the upstream petroleum industry with national and international climate goals.

iii. **Mandatory Environmental Reporting**: Nigeria has announced that businesses will be required to disclose their environmental practices and climate change management in financial reports within four years. This move aims to enhance transparency and accountability in corporate environmental performance.

While the NCCPRS outlines comprehensive strategies to mitigate GHG emissions across various sectors, the projected increase in emissions suggests that the implementation of these initiatives has been insufficient. Strengthening policy enforcement, enhancing institutional capacity, and fostering greater public-private collaboration will be crucial to bridging the gap between policy intentions and actual outcomes. Additionally, aligning national policies with international climate commitments, such as the Paris Agreement, will be essential for achieving meaningful emission reductions and promoting sustainable development in Nigeria.

Climate-Resilient Technologies and Sustainable Practices to Environmental Sustainability in Nigeria. An Assessment

Nigeria, as one of Africa's most populous nations, faces significant challenges due to climate change, including erratic rainfall patterns, prolonged droughts, desertification, and flooding. These environmental stresses exacerbate food insecurity, threaten biodiversity, and hinder economic development. In response, the Nigerian government, through the National Climate Change Policy Response and Strategy (NCCPRS), has initiated various programs aimed at fostering climate resilience and sustainable development. This section of the paper assesses the effectiveness of these initiatives, focusing on climate-resilient technologies and sustainable practices in renewable energy, agriculture, and community-based adaptation strategies.

1. The National Climate Change Policy Response and Strategy (NCCPRS)

The NCCPRS, established in 2012, serves as Nigeria's primary framework for addressing climate change. Its overarching goal is to promote low-carbon, high-

growth economic development and build a climate-resilient society. The strategy emphasizes the integration of climate considerations into national development plans, with specific targets in areas such as afforestation, renewable energy adoption, and sustainable agriculture.

2. Renewable Energy Technologies

The adoption of renewable energy technologies is central to Nigeria's climate resilience strategy. Solar and wind power initiatives have been implemented to reduce dependence on fossil fuels and enhance energy security. For instance, the Nigerian government has partnered with international organizations to develop solar-powered irrigation systems, which not only provide reliable water sources for agriculture but also reduce greenhouse gas emissions.

3. Sustainable Agricultural Practices

Agriculture is both a victim and a contributor to climate change in Nigeria. The National Agricultural Resilience Framework (NARF), launched in 2014, aims to mitigate the negative effects of climate change on agriculture by promoting practices such as agroforestry, conservation agriculture, and the use of drought-resistant crop varieties. These practices enhance soil fertility, improve water retention, and increase biodiversity, thereby strengthening the resilience of farming communities.

4. Community-Based Adaptation Strategies

At the grassroots level, community-led adaptation strategies have proven effective in building resilience against climate impacts. Programs integrating indigenous knowledge with modern technologies have been implemented to enhance food security, improve water management, and reduce vulnerability to climate-related disasters. For example, the Community Resilience Project in southeastern Nigeria focuses on ecosystem-based adaptation (EbA), which utilizes natural systems to buffer communities against climate change impacts.

The National Climate Change Policy and Response Strategy (NCCPRS) Implementation Challenges

The **National Climate Change Policy and Response Strategy (NCCPRS)**, launched in 2012, represents Nigeria's comprehensive framework for mitigating and adapting to climate change. It aligns national development with international climate commitments, such as the United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement (Federal Ministry of Environment [FMEnv], 2012). The policy outlines strategies across sectors including energy, agriculture, forestry, transportation, and urban development, emphasizing sustainable development, greenhouse gas (GHG) mitigation, and climate resilience (FMEnv, 2012). Despite these ambitious objectives, implementation has faced persistent challenges that undermine effectiveness.

i. . Institutional and Governance Challenges

A major barrier to effective NCCPRS implementation is weak institutional capacity. Multiple agencies, including the FMEnv, the Nigerian Meteorological Agency (NiMet), and the National Environmental Standards and Regulations Enforcement Agency (NESREA), are tasked with overlapping responsibilities, leading to coordination difficulties (Ozor et al., 2018). In addition, low technical capacity, inadequate staffing, and limited expertise in climate modeling and adaptation planning constrain the execution of climate strategies (Olaniyan & Akinola, 2020). Governance issues, such as bureaucratic delays, fragmented policy implementation, and poor inter-ministerial collaboration, exacerbate the situation, often resulting in duplication of efforts or gaps in enforcement.

ii. Financial and Resource Constraints

Funding limitations pose a critical challenge. Climate action in Nigeria is heavily dependent on public budgets and international support. However, insufficient domestic financing, coupled with limited access to global climate funds, hinders the scaling of mitigation and adaptation projects (Oladipo et al., 2021). Many local governments lack resources to implement community-level interventions outlined in

the NCCPRS, and private sector participation remains underdeveloped due to perceived financial risks associated with green investments.

iii. Data Gaps and Research Limitations

Effective climate policy implementation relies on accurate and timely data. In Nigeria, inadequate climate data collection, poor monitoring systems, and limited research infrastructure undermine evidence-based decision-making (Ozor et al., 2018). Lack of consistent GHG inventories, sectoral emission data, and vulnerability assessments impedes the prioritization of interventions, reducing the policy's impact.

iv. Public Awareness and Stakeholder Engagement

The NCCPRS emphasizes stakeholder participation, including communities, civil society, and the private sector (FMEnv, 2012). However, low public awareness of climate risks and policy objectives remains a barrier. Many citizens, particularly in rural areas, are unaware of climate adaptation practices or fail to perceive the relevance of national climate policies (Olaniyan & Akinola, 2020). Inadequate engagement with local stakeholders often leads to poor uptake of climate-resilient practices and weak community ownership of projects.

v. Policy Integration and Mainstreaming Challenges

Integration of climate change objectives into sectoral policies is essential for holistic implementation. In Nigeria, however, the NCCPRS has struggled with mainstreaming climate considerations into national development planning, energy, agriculture, and urban policies (Oladipo et al., 2021). This is partly due to competing development priorities, short-term political cycles, and limited institutional incentives to prioritize climate action within traditional policy frameworks.

vi. Socio-Economic and Political Context

Nigeria's socio-economic challenges, including poverty, unemployment, and political instability, also hinder NCCPRS implementation. Climate projects often compete with pressing socio-economic needs, and political transitions can lead to shifts in priorities, disrupting continuity in climate initiatives (Ozor et al., 2018).

Moreover, corruption and weak accountability mechanisms reduce the efficiency and effectiveness of allocated funds for climate interventions.

Methodology

This study adopts a qualitative research design, emphasizing an in-depth understanding of the subject matter through non-numerical data. The research relies exclusively on secondary sources of data collection, including peer-reviewed journals, books, government reports, policy documents, and credible online databases. These sources provide rich and contextual information necessary for examining the phenomenon under study. Data analysis is conducted using descriptive and documentary methods, where the collected materials are systematically reviewed, categorized, and interpreted to identify patterns, themes, and insights relevant to the research objectives. The descriptive approach allows for a detailed explanation of the findings, while the documentary method ensures that historical and contemporary records are critically analyzed to provide a comprehensive understanding of the topic. This combination of methods ensures that the study remains rigorous, reliable, and grounded in established literature.

Findings and Discussion

The findings of this study indicate that the implementation of the National Climate Change Policy and Response Strategy (NCCPRS) in Nigeria has yielded moderate effectiveness, particularly in promoting climate-resilient technologies and enhancing environmental awareness among key stakeholders. Notable successes include the adoption of renewable energy initiatives, such as solar and wind power projects, as well as the promotion of sustainable agricultural practices, which have contributed to reductions in greenhouse gas emissions in targeted sectors. However, the study also identified significant gaps and challenges, including limited funding, inadequate institutional coordination, weak enforcement of regulatory frameworks, and low levels of public participation, which hinder the full realization of the policy's objectives. Comparative assessment with global best practices reveals that while Nigeria's NCCPRS aligns with international climate change mitigation strategies in principle, it falls short in implementation rigor, monitoring and evaluation

mechanisms, and integration of private sector participation, highlighting the need for strengthened governance structures, enhanced stakeholder engagement, and strategic alignment with global standards to achieve greater environmental sustainability outcomes.

Conclusion

The analysis of Nigeria's climate change policy landscape, particularly the implementation of the National Climate Change Policy and Response Strategy (NCCPRS), reveals several key insights. First, the policy has facilitated the adoption of climate-resilient technologies and sustainable practices across critical sectors, including energy, agriculture, and industry, contributing to measurable reductions in greenhouse gas emissions. Second, institutional and regulatory frameworks under the NCCPRS have played a pivotal role in promoting coordination among governmental agencies, private actors, and communities, thereby enhancing the effectiveness of mitigation and adaptation efforts. Third, while progress has been made, challenges such as limited funding, inadequate technical capacity, and weak enforcement mechanisms continue to constrain the full realization of policy objectives.

This study contributes to knowledge by providing an integrated assessment of the effectiveness, successes, and gaps in Nigeria's climate change response. It highlights the linkages between policy frameworks, technological adoption, and environmental sustainability, offering empirical insights that can inform both future research and practical interventions. From a policy perspective, the findings underscore the need for stronger institutional coordination, targeted capacity-building initiatives, and the incorporation of local knowledge into climate change strategies to enhance resilience and sustainability outcomes.

Policy Implications and Recommendations

i. **Strengthening Climate Change Governance**

Government should establish transparent monitoring and accountability mechanisms, improve regulatory compliance, and institutionalize climate reporting standards across sectors. Strengthened governance will reduce policy fragmentation and enhance coordinated responses to climate challenges.

ii. **Integrating Sustainability into National Planning**

Practically, Nigeria should mainstream climate considerations into fiscal policies, infrastructure development, and urban planning. This includes adopting climate-proofing approaches in agriculture, energy, and transportation sectors, ensuring that development projects simultaneously promote economic growth and environmental sustainability.

iii. **Enhancing Institutional Capacity**

government should invest in training programs for public officials, improve research and data collection systems, and strengthen the technical competence of environmental agencies. This will improve evidence-based decision-making, policy enforcement, and the ability to respond effectively to climate-related risks.

iv. **Promoting Community Participation and Private Sector Engagement**

Nigeria should foster community-led adaptation programs, incentivize private sector investment in green technologies, and create platforms for multi-stakeholder dialogue. Engaging civil society and businesses can enhance resource mobilization, knowledge sharing, and adoption of sustainable practices at the grassroots level.

v. **Leveraging Technology and Innovation for Sustainability**

Practically, Nigeria should promote the development and deployment of renewable energy technologies, climate-smart agriculture, and digital monitoring systems for emissions and natural resource management. Public-private partnerships in research and innovation can accelerate the adoption of cost-effective, scalable solutions that address climate risks while supporting sustainable economic growth.

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